

## VI. Notes on three Paussi. By LOUIS PÉRINGUEY.

[Read February 7th, 1883.]

*Paussus lineatus*, Thunberg.

I FIRST discovered *Paussus lineatus* amongst a small kind of black ant very numerous on the slopes of Table Mountain. These ants have their nests under stones; they excavate no galleries, and select those stones which are situated at the foot of a small bush. There seems to be but one class of workers; the females are 0·1 in. in length, the winged males 0·05 in.

I mostly found one *P. lineatus*, sometimes two, only once three, in the same nest. In nearly every instance it was clinging to the under side of the stone, elytra downwards. I first captured five specimens, and with them I collected a number of ants and their larvae. I deposited them in a glass cage, where I could have a good view of them; but whether the beetles and the ants had been too much shaken in the receptacle I first put them in I cannot say, but three of the *Paussi* died two days after, and the two that were left no longer crepitated when handled, as they were wont to do when I first captured them. I then procured a new batch of ants from several nests, being under the impression that the *Paussidæ*, like the *Clarigeridæ*, were fed by ants, and I conjectured that the three that died had not been properly attended to by the ants I had enclosed with them in the glass cage. But the increase in the number of ants did not seem to affect them; they were still very torpid. On the discovery of sixteen more *P. lineatus*, I added these to my colony, having previously affixed a small bit of putty to the elytra of the first comers. The following day these two ancient individuals seemed to have recovered their energy; they both proved to be males. Altogether I enclosed twenty-one specimens in the cage, and, with the exception of the first three, all thrived well; I have twelve of them, apparently females, still alive, after sixty days of captivity.

My object was to find out if the *Paussi* were kept in  
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captivity by the ants for any purpose, and I do not think now that such is the case, as the following will, I hope, show.

I kept my glass cage in a rather dark room; but if I placed it in the sun the *Paussi*, which had previously been sluggish in the extreme, suddenly became very lively, perambulating the cage in the most excited manner, moving their antennæ very rapidly in a vertical line, folding and unfolding their wings, trying a clumsy flight, setting to clean themselves with their legs, and invariably seeking shelter under some bean-pods that I had put in the cage for the female ants to deposit their eggs under. Then the disc of the elytra and the antennæ would assume a most glossy appearance. Yet, whenever I placed the cage in the sun, the worker ants would set to work at once to free the larvæ. If at any time the unwieldly and (to the ants) bulky *Paussus* approached one of them, the ant, leaving off its work, would immediately seize hold of it and try to pull it in another direction; the *Paussus* would then stop, bring its antennæ forward, and stretch out its legs so as to find a better "point d'appui." Some of the other workers would come to the help of their fellow, and tug vigorously at the antennæ, always rigidly pointed forward, until the *Paussus*, feeling it could not keep its ground, would start away at a rapid pace. Then the workers would resume their work. But it often happened that the *Paussus*, in spite of the ants, made straight for the place where the larvæ and eggs were sheltered, and, finding in the pods a support that the glass surface could not afford it, it would settle in the middle of the colony in spite of the efforts of the workers; these, after a vain effort to dislodge the intruder, carried the larvæ away; the *Paussus* would then remain motionless for days in the same spot.

I thought at first that the *Paussi* were feeding on the newly-born ants, but closer and repeated observations enabled me to conclude that the workers tried to drag them away only for fear they should injure the delicate and almost transparent newly-freed individuals. I often saw the ants carry the young in their mandibles from the direction taken by a fast-walking *Paussus*. I put together six newly-born ants and two *Paussi*, and, though the jelly-like creatures did not assume a black colour and become perfectly developed until from fifteen to

thirty minutes had elapsed, the *Paussi* did not avail themselves of their helpless state to devour or injure them. I have several times repeated this experiment.

I have never seen the *Paussus* crepitate when attacked and forced to run away by the workers, but if touched at the same time with a straw or with the hand, it would give out a series of very audible explosions ; its antennæ, prothorax, and elytra suddenly became covered with a yellowish substance, turning almost immediately into a yellow powder, and which is so adhesive that if the *Paussus* at that time was thrown on his back, it adhered for a short time to the glass. It would then right himself by the aid of one of its antennæ acting as a lever. These explosions leave on the fingers a stain very much like that produced by an application of lunar caustic, that will last several days in spite of repeated washings.

The beetle was always in a torpid state when I discovered it, and as soon as touched walked at a slow pace, crepitating all the while, and trusting apparently to its artillery for protection. I think that it is of crepuscular habits rather than nocturnal ; for, if I examined my box at night, I always found it in its torpid state, but a short time after the appearance of the light it began to move about. However, the first *P. lineatus* I possessed was caught in the middle of a very hot day by a boy, who, feeling on his neck something that he said "stung him," seized the insect. It did not occur to me at the time to examine the spot, but I have no doubt that it was the discharge of the insect that caused the smarting pain the lad complained of.

The copulating process is rather singular. The male fixes his mandibles in the prothoracic excavation of the female, and, with his hind legs, brings the anal segment of the female towards him, apparently with great difficulty and labour ; in order to strengthen himself, he has his antennæ passed under hers. I have seen males carried on the backs of females for twenty-four hours without relinquishing their hold, but as soon as placed in the sun they soon accomplished their functions and got separated from the females in a time varying between fifty-six and fifty-eight seconds. After brushing himself with his fore and hind legs the male would go in search of another female. One of my spotted males has thus fecundated no less than five females in four days.

I never saw the ants attending to the *Paussi* or seeming to draw any nourishment from them. Still, the *Paussi* seem to affect those spots where the eggs and larvæ are deposited, perhaps because they are the most sheltered places. I fed the ants with sugar and sweet biscuits. I have kept them for two months, and I still have eleven *P. lineatus* alive, although the males are apparently all dead. I never saw the females depositing their eggs, but I think they may have done so in a biscuit excavated by the ants.

That the *P. lineatus* is *not fed* by the ants, among which I always found it, seems to me to be proved by a close observation of two months' duration ; still the fact remains that I have not seen it in the act of taking food. On one occasion I saw four on a piece of sweetened orange I had put as food for the ants. Now this *Paussus*, when in motion, always carries its palpi hanging at right angles, and one of those four,—the only one of whom I could get a full view,—had its palpi hanging in the usual manner, but I could not detect any sign of its jaws being in motion. I should think that Burmeister was right in calling them carnivorous insects, because with the second lot of *P. lineatus* I placed five specimens of the minute *P. Linnei*, Westw., and the day after there was but one of them left ; that one was shorn of one of its antennæ, and died soon after I had removed it. The box being so well closed that the insects had no opportunity whatever of escape, I concluded that they had been devoured by the *P. lineatus*. On a second experiment, of two days' duration, three *P. Linnei* came out unscathed, except one, who lost its fore leg.

I afterwards separated five *P. lineatus* from the ants, and left them without food for eight days, but I could not detect any sign of their having suffered by their fast ; they were, when exposed to the sun, as lively as those I had left with the ants.

These observations make me think that this *Paussus* is merely tolerated by the ants amongst which it is found, or perhaps kept as a pet, especially if one takes into consideration that in one case only have I found three specimens in the same nest, seldom two, and generally one only.

This species seems to have a wide range, as the Cape Town Museum has in its possession two specimens captured in the Transvaal.

*Paussus Linnei*, Westwood.

The habitat of this minute and very rare *Paussus* was until now only a surmise. Lacordaire thought it might come from India, and Gemminger and Harold gave its habitat as "incertæ sedis." The fact that it is so small, and that I never but once found two together, seems to account for its rarity in collections, the only one known being, I think, that which Prof. Westwood described.

I found it in the nest of an ant very common on the slopes of Table Mountain, building galleries, though not at a great depth, under stones often adjoining the nests of the kind in which I found *P. lineatus*. These ants have two sorts of workers: a worker major, more than twice the size of *P. Linnei*, with a very large head, and a very minute worker minor.

This species is very much more active than *P. lineatus*, going at a very fair pace if we consider the characteristic sluggishness of those insects. Like *P. lineatus*, it exudes the same pus-like matter, and crepitates with great vivacity without slackening its speed.

When I uncovered the nests, the major workers, sallying out in quest of the enemy, would sometimes seize hold of the *Paussus*, but they relinquished their hold immediately, and went in search of the other supposed intruder.

I did with this insect what I had done with its congener, and brought home a colony of the ants, which I placed in a large glass jar with seven *P. Linnei*.

Whether the major workers became infuriated by their captivity, I do not know, but whenever a *Paussus* passed close to the larvae carefully heaped in a corner by the minor workers and apparently jealously watched by the major, it would be immediately set upon by one or two of the latter, the onslaught resulting in the loss to the *Paussus* of a leg, an antenna, and even once a head. In two days my specimens were mutilated or killed in that way. One male *in copulâ* was pounced upon and had his antennæ, as well as those of the female, snapped off without relinquishing his hold of her. Four other specimens that I put in the jar shared the same fate; the only unmutilated specimen remaining being one that had judiciously climbed a twig I had put in the bottle.

I had not the same chance of observing this species as I had with *P. lineatus*, yet they seemed at first to exhibit

the same habits, becoming very lively when exposed to the sun, but not attempting flight. As the ant-larvæ did not hatch before the *Paussi* were mutilated, I could not observe how the minor workers behaved towards them. They were never attacked by the major workers except when they came near the larvæ, and never used their crepitating power when thus attacked.

I have not since been able to get more specimens.

*Paussus Burmeisteri*, Westwood.

This *Paussus* is much more sluggish than *P. lineatus*. It crepitates when seized, exuding the same liquid, and then shams death, stiffening its antennæ to such an extent as to enable one having hold of them to move it in all directions. I never found two together, and, although I discovered it twice in the nests of the same ant as *P. Linnei*, I generally found it under stones, where there was no ant's nest within a radius of several yards.

I once captured one that was being dragged by one major and three minor workers towards a very small colony of ants; it was simply opposing its force of inertness to the efforts of its would be captors, lying on its back, with its antennæ stiffened; but as soon as I had touched it with a straw it discharged its artillery, stunning, apparently to death, the minor workers, and doubling up the major, who kept on staggering for a very long time.

Like the two above-mentioned species, when exposed to the sun, it gets lively enough, though in a lesser degree, but I never saw one expanding its wings or trying to fly.

All my specimens died soon after their capture, and I never saw any *in copulâ*.

I have not been able to detect any sign of phosphorescence in the antennæ of any of my *Paussi*, although frequently examined in the dark.

P.S.— Since the above notes were written all my *Paussus lineatus* have died, also the ants.—L. P.